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THE TREND OF THE RETURNS TO EDUCATIONS IN URBAN CHINA DURING 1988 TO 2002

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ABSTRACT

China underwent a significant social and economic transformation starting from the 1980s. The transition to market oriented economy brought change to the market of human capital. Using Mincer-type equation, we analyzed the returns to education in China using the data from the Chinese Household Income Project Survey conducted in the years 1988, 1995 and 2002, which covers the most interesting period. Although the returns to education were found generally lower than world average, a significant and steady increase in the returns was observed. Actually, the returns to each schooling year were more than doubled in the fourteen years. This increase was shown to be robust under different conditions, with job categories, geographical effects taken into account. This confirms that the increase is not due to structural changes among different sectors or locations. Structure changes of the returns to education in the sense of education levels were also observed, with higher education levels increasingly rewarded.

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CHAPTER 1: INTRODUCTION

During the past several decades, China experienced a significant social, political and economic transformation. The economic reform from a planned economy to market-oriented one, which dates back to 1980s, has brought about remarkable economic growth. Obviously, there are numerous interesting questions about explaining the growth, and also how it can be sustained. Among the different factors that supported the growth, the human capital had been an important one and will continue to be a critical issue for China's continuous development.

On the macro side, Krugman (1994) attributed the "myth of Asia's miracle", including China, to the increase in their input. Singapore and Japan were mentioned as typical examples in Asia where the human capital is greatly enhanced by the investment in education. While China has world's largest labor resource in the sense of quantity, it is unfortunately significantly lagged behind in increasing the quality of labor resource. The exploration of the human capital is therefore a critical issue to understand the economic growth in China. Indeed, Chen and Feng (2000), using a cross-province analysis, provided strong evidence in the accumulation of human capital through education is an important contributor to economic growth in China since the economic reform. Such analysis provide rich information for the government to make the right policies for sustained growth.

On the micro side, human capital is the stock of competences, knowledge and personality attributes that is capable of producing economic value. Empirical analysis indicates that an equation can be built with earning on the left side to reflect the productivity or output of the human capital, while education and work experience are on the right side as input of the human capital. Statistics clearly show that the additional input yields additional output. In this sense, human capital is just like other physical capitals, like land and machines; however, it is substitutable but not transferable. Since work experience is not an easily controllable input variable, a common approach to analysis the above human capital balance sheet is therefore through the so called *Returns To Education* (RTE), which is the focus of this thesis.

While in China, the egalitarianism in China holds an "equal work, equal pay" earning system before the economic liberalization. The real wages are a result of government policy instead of a reflection of individual productivity. Under the framework of human capital theory, people have found very low RTE in the early days (Liu 1998) which is a reflection of the enforced "equal pay" in China back then. The incentive for pursuing higher education was not to pursue higher income. Historically, there was even a national wave of doubting the value of higher education during the Cultural Revolution. Previous analyses indeed showed that the return to education and other income related statistics had a trend that is significantly influenced by the political/economical status and policies in China. Fleisher and Wang (2005) showed the trends RTE coincide with social transformation starting from 1950 to 1999, where the effect of Cultural Revolution was obvious.

It would be interesting to see how RTE have changed since the economic reform in China using extensive and reliable data. Therefore, in this thesis, the income distribution among the different qualities of labors, among different economic entities, sectors, or geographic regions is analyzed. It should provide rich information on the trend of economic reform. On the one hand, it reflects how the capital resource is distributed. On the other hand, it tells how the education investment is rewarded. The Chinese Household Income Project Survey (CHIPS) data conducted in 1988, 1995 and 2002 was used in this thesis. A number of research papers are based on these data. Most of the existing studies analyzed the data of a specific year, while few studies used the three year's data as a whole. Thus I will use Chinese Urban Individual data of all these three years to analyze the relation between China's economic development and the wage inequality.

The remaining part of this paper is organized as follows. The second chapter gives a historical review on literatures regarding the RTE in China, which also includes some research on the overall income inequality problem. The third chapter describes the dataset I use in this research and the related processing procedure and method. The fourth chapter presents the data and analysis centering around the changes of education return in the 1988 to 2002 period in several aspects. I will confirm the rapid raising trend of the returns to education in detail and consider the effects of the ownership, economic sector and geographic location.

CHAPTER 2: LITERATURE REVIEW

Since Mincer's pioneering research on human capital theory (Mincer, 1974), numerous studies on the returns to education in different countries and different areas have followed. Many of them are reviewed by Psacharopoulos and Patrinos (2005).

In the existing researches, researchers found that the return of education is very low in the 1980s. Comprehensive data for China was not available until the publication of the Chinese Household Income Project Survey (CHIPS) which was conducted 1988, 1995 and 2002. Before the data was available, Knight and Song (1991) estimated an RTE to be around 1% during the 1980s using a dataset regarding 3600 individuals in urban areas of China. Since the sample size used in the study is relatively small, a series of later studies followed using the CHIPS dataset. Using the 1988 data, Johnson & Chow (1997) estimated a RTE ranging from 2.8% to 4%, with interaction terms between gender and schooling and between gender and experience. No significant interaction was found and the overall low RTE is confirmed. With the same dataset, Liu (1998) also confirmed the low RTE in the period, yielding a value of 3.6% for RTE. Though higher than previous estimation, this is clearly significantly lower than the world average level of 10.1%, also

lower than the average Asian return level of 9.6% at the same time period (Psacharopoulos, 1994).

Although the low RTE is compatible with the egalitarian ideology in China before the economic reform, a RTE that is too low is harmful to the economic growth because the private demand for education is suppressed. Also, with China's transition to market-oriented economy, changes should appear in the human capital market in addition to the market of real commodities. Li (2003) used the 1995 CHIPS dataset and calculated a RTE of 4.7 using conventional method. Although this return significantly increased since 1988, it still seems too low and not compatible with the economic reform that have undergone for almost a decade. The author further pointed out that the previous estimation of the RTE China did not include the working hours during the analysis. If the hourly wage is considered, the RTE should be around 5.3% because people with higher education levels generally worked fewer hours in China. Yang (2005) also investigated the RTE during the economic transition period of China. Using both the 1988 and 1995 CHIPS data, he studied the across-region dispersions and the changes over time in RTE. By considering the cities, the RTE on the city level increased from 3.1% to 5.1% in the seven years period.

While Ordinary Least Squares (OLS) was extensively used the studies, an inherent problem of the method is that neglecting variables may cause bias. Researchers found that the RTE value or the wage difference may be attributed to factors including ownership of the enterprises, economic sectors, regions, etc. Using another set of data

from China's National Bureau of Statistics, Zhang and Zhao (2005) studied the effect of adding variables of job categories during the regression. While the simple method estimated that the RTE increased from 4% to 10% during 1998 and 2001, additional variables leads to significantly smaller RTEs ranging from 2.3% to 6% from 1988 to 2001. This indicates the appreciable wage inequality between ownership types of the business, economic sector and regions. Actually, according to Davis (1992), the great contribution of region dummies to urban residents' income inequality reflects the persistent barriers to Chinese labor mobility. The RTE in different provinces was also found to be different (Li, 2003). Using 1995 CHIPS data, the less developed provinces, Gansu, was found to have a higher RTE than the more developed costal province, Guangdong.

To sum, although the absolute value of RTEs during the transition period is difficult to be evaluate quantitatively, we feel that the rising trend should be robust and marketization should have indeed contributed to a significant increase in the relative wages of educated workers. Also, it will be interesting to analyze the robustness of the increase under constrains, in order to observe the sources for the wage inequality. In addition to the 1988 and 1995 CHIPS data, which was extensively used in previous literatures, we feel that adding the 2002 data and performing a 14 year period trend analysis in the above mentioned topics should be valuable in explaining the RTE and related issues during the economic transition in China.

CHAPTER 3: DATA AND PROCESSING METHOD

3.1 Data description

The Data used in this thesis are from the Chinese Household Income Project Survey (CHIPS) conducted in 1988, 1995 and 2002. These data were conducted by a group of international scholars together with the Chinese Academy of Social Science and the National Bureau of Statistics of China. In the research of Khan and Riskin (2005), the CHIPS data is believed to "still remain the only available source of (almost) nation-wide household-level data on income and other individual and household characteristics in China" and "provide the only comprehensive data base for the application of an income definition that helps overcome the limitations of the official definition underlying the published income data in China." The sample sizes of these datasets are quite large. For urban China individuals alone, they contain information from 31827, 21698 and 20632 samples for the 1988, 1995 and 2002 data, respectively. Participants are both from publicly and privately owned businesses, and cover a wide range of economic sectors, including agriculture, manufacturing, commerce, service and etc. All the datasets are also geographically representative. The CHIP-1988 data covers 10 provinces, including: Beijing, Shanxi, Liaoning, Jiangsu, Anhui, Henan, Hubei, Guangdong, Yunnan and Gansu. Sichuan was added in CHIP-1995. Chongqing was added in CHIP-2002 since it

Variable name	Definition	Mean		
		88	95	02
sex	1=male, 0=female	0.494	0.50	0.494
age	age	32.31	35.66	38.24
Current status	Currently employed or self-employed	2.19	2.19	2.19
working	Working or employed	0.567	0.567	0.567
Ethnic minority	1= yes, 0= no	0.025	0.646	0.044
Party member	1=Yes, 0=no	0.150	0.045	0.214
Education	Education level	4.54	4.34	4.96
College (Collegegrad)	College (or university) and up	0.0383	0.060	0.074
Professional	Professional school	0.040	0.100	0.143
Midprofessional	Middle level professional, technical or vocational school	0.067	0.126	0.097
Upmiddle	Upper middle school	0.154	0.195	0.235
Lowmiddle	Lower middle school	0.252	0.281	0.267
Elementary	Elementary school	0.097	0.151	0.125
Below	Below elementary school	0.352	0.087	0.059
Schooling	Total number of years of schooling received	5.4	9.5	9.5
Experience	Work experience	20.91	21.65	20.09
Experencesq	Experience square			
Ownership	Ownership of the primary workplace			
State-owned	State-owned sector	0.387	0.27	0.177
Local-public	Local public-owned sector	0.383	0.53	0.283
Collective	Urban collective sector	0.201	0.16	0.104
Non-public	Non-public owned sector	0.029	0.022	0.436
Economic sector	Economic sector coder			
Agriculture	Agriculture, forestry, etc. industry	0.010	0.017	0.012
Manufacturing	Manufacturing industry	0.425	0.412	0.251
Mining	Mining and geographic survey industry	0.032	0.011	0.016
Construction	Construction industry	0.034	0.030	0.033
Transportation	Transportation and communication industry	0.067	0.048	0.079
Commerce	Commerce and trade, etc.	0.147	0.14	0.124
Service	Health, education, research, finance, etc. industry	0.285	0.352	0.485
Wages	Yearly total income	1000.32	6153.34	10679.42
Lnwages	Yearly wage in logarithm			

Table 3-1. Summary of variables and their mean values over the three years.

was a new municipality separated from Sichuan. The chosen of provinces was intended to be representative. For example, the capital Beijing is a fast growing municipality in the north; Liaoning has long been the heavy industry center in the north; Guang dong and Jiangsu are more developed coastal provinces while Gansu is a less developed inner land province.

In all of the calculations regarding RTE, sub-samples of the entire datasets were used. The individuals taken into account are permanent workers/employees of the enterprises and institutions or long-term contact workers/employees who reported positive earnings. Retired people and full time students were excluded. Temporary workers were not considered as they have a fluctuating income that tends to affect the reliability of the regression. Self-employed individuals and owners of private enterprises were also excluded. It is difficult to separate the income from the profit of the enterprise/economic activities, i.e., their income are a blend of returns from human capital investment and capital investment of the common sense.

Although both urban and rural areas were sampled in CHIPS, only the urban individual data were used for all of these three years. All datasets contain a wide range of demographic and economic variables, including income, expenditures, assets, employment information. The variables used in this thesis are summarized in Table 3-1.

Besides schooling year and work experience variable, gender, communist party member, ethnic minority are included exclusively in all regressions. Since there is no reason to

assume the same RTE for all levels of educations, dummy variables regarding education levels are included to more detailed regressions. The levels included are: college (which means the individual at least receive college or above college level education), professional school, middle level professional school, upper middle school, lower middle school, and elementary or lower than elementary school. The RTE may also be different for enterprises that are with different types of ownerships or in different economic sectors. Therefore, dummy variables reflecting such differences are also included in the analysis. The economic sectors are divided into: agriculture, manufacturing, mining, construction, transportation, commerce and service. The variable ownership contains: state-owned sector, local public-owned sector, urban collective sector, and non-public owned sector.

The annual gross income was used which contains all types of wages, including the basic, bonus, floating wages, subsidies, etc. Even though, it is difficult to include all types of income because it is difficult to track the medical care and housing systems. These unavailable data would be extremely valuable to add all the existing literatures regarding the income status in China.

3.2 The Mincer Equation

The Mincer equation is an important contribution to the human capital theory. Although it was proposed more than 30 years ago, it remains a benchmark for estimating wage determination equations. The rate of return is positively related to education experience and work experience. The former relation is generally taken as linear, while the later

relation usually is taken as quadratic to reflect the diminishing effect of experience in the later years.

The basic equation used in this research is as follow:

$$log(W_i) = \beta_0 + \beta_1 \mathrm{V_i} + \beta_2 \mathrm{E_i} + \beta_3 \mathrm{E_i^2} + \varepsilon_\mathrm{i} \quad (1)$$

In the above equation, *W* is the annual wage rate, which includes regular wage, bonuses and all kinds of subsidies and allowances. *V* stands for schooling years or other dummy variables including education levels, economic sectors, gender, party member, etc. *E* is each individual's experience. ε denotes bias, which is caused by variables omitted in the data collection. The subscript *i* denotes years: 1988, 1995, and 2002.

3.3 Data preprocessing

Though the survey was carefully conducted, the data, unfortunately, are not panel data. Extra processing is still required for a parallel comparison. For example, the CHIPS-1988 does not include *work experience* nor *years of schooling* as the other two datasets do. Because the *work experience* is such an important variable in the following analysis, we need to infer its value from other information in the dataset. Age may reflect *work experience* to a certain extent; however, it is clearly an overestimation. A more accurate approach is to calculate the *work experience* through the age and *years of schooling*. The variable *years of schooling* may be in turn estimated by the *education level*, using the average number of years it takes to finish a certain level of education. Because the

elementary school education barely affects wage rate, I ignored those only finished the elementary school or below. The variable *years of schooling* is then obtained through:

$$schooling = college*15 + professional*13 + midprofessional*11 + upmiddle*10 + lowmiddle*8 \quad (2)$$

In this equation, "*schooling*" means the number of years of education that an individual receive. All other education levels such as "*college*", "*professional*", etc. are dummy variables, each having a value of either 0 or 1. Therefore, people graduated from a middle professional school would have the *years of schooling* of 11, since only the *midprofessional* dummy variable is 1. The individual's working experience can be then calculated from:

$$Experience = age - schooling - 6 \quad (3)$$

where the number 6 indicates the average pre-elementary school age.

There are other restrictions during the selection of effective data. Only working or employed individuals with age between 18 and 60 were considered in the following analysis, which excludes disabled, retired or student individuals. We did not perform the hourly wage correction as did by Li (2003). On one hand, such information is not available in the 1988 data, which excludes the possibility for parallel comparison; on the other hand, the annual wage is more widely used in the literatures and the two kinds of analysis lead to only ~10% difference. In the present thesis, we focus more on the trend

of education return value over the 14 years; therefore the conclusion will be the same as long as the calculation is made consistent over the three datasets.

The regression method used here is the Ordinary Least Squares (OLS). OLS may bias the estimate of returns to the variables, because it is difficult to include the entire possible variable affecting the wage rate. For example, it is difficult to include a variable that describes the individual working ability, which should also affect the wage. Such variable, if available, would also be correlated with one's education level.

CHAPTER 4: OBSERVATIONS AND ANALYSIS

Observation 1: The RTEs in China is lower than world/Asian average, but have been increasing since 1988.

The overall returns to education for each additional schooling year is estimated below, using years of schooling, experience, gender, party member and ethnic minority as control variables. This counts for the ordinary Mincer equation regression. Detailed regression results are shown below in Table 4-1. The RTEs of different years are also summarized in Figure 4-1.

Variables	1988	1995	2002
schooling	0.0313	0.0470	0.0684
	(54.5)	(30.09)	(32.47)
Experience	0.0343	0.0503	0.0258
	(46.07)	(29.91)	(10.79)
Experience squared	-0.0003	-0.0008	-0.0002
	(-16.82)	(-21.32)	(-3.98)
Male	0.0774	0.1357	0.1517
	(17.81)	(13.72)	(12.40)
Party member	0.0742	0.1592	0.1125
	(13.64)	(13.69)	(7.98)
Ethnic minority	-0.0070	-0.0522	0.0479
	(-0.63)	(-2.21)	(1.59)

T-statistics are in parentheses. All errors are heteroskedasticity robust.

Table 4- 1. RTEs based on ordinary Mincer equation.

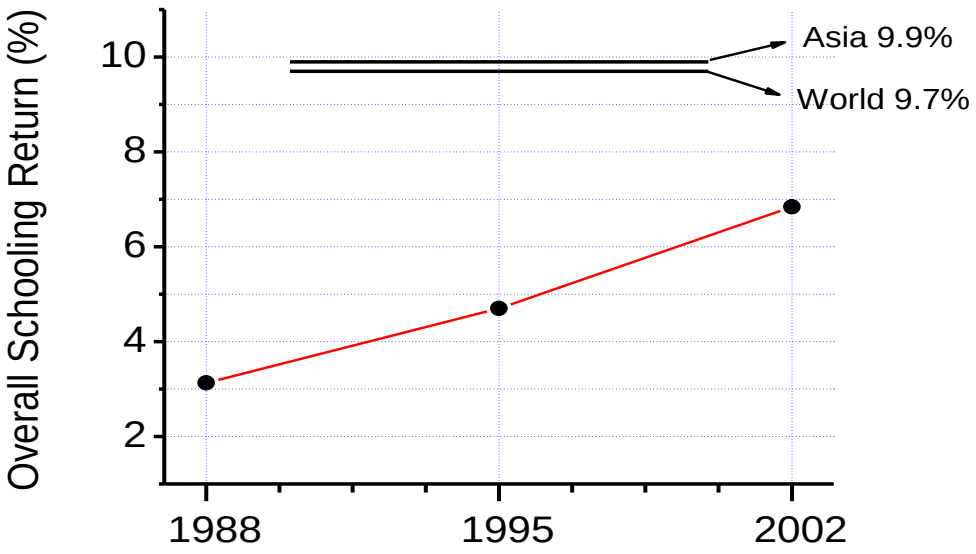

Figure 4-1. Changes in returns to educations over the period of 1988 to 2002 using two datasets.

The RTE obtained in this research was 3.1% in 1988, in accordance with previous investigations, where values ranging from 2.8% to 3.6% were obtained due to slightly different selection of variables and sub-samples (Johnson & Chow, 1997; Liu, 1998; Yang, 2005). The RTE for 1995 is 4.7 %, in accordance with Li's results without hour wages correction (Li, 2003). The RTE for in year 2002 is 6.8, which is not calculated in existing literatures. The highest RTE of 6.8% among three years is still far below the world average 9.7% or the Asian average 9.9% (Psacharopoulos, 2004).

The significant lower education return may be explained by the Chinese economic structure or ideology. It is not surprising that the RTE back in 1980s' would be very low.

The egalitarianism in China before the economic reform had lead to an "equal pay for equal work" earning system, where the amount of work is mostly defined by the amount of effort. The individual income is largely set by the central planning systems. The working skill level played minor role in defining the earning, nor the education level. Even though the economic reform had a clear effect of increasing the RTE over the years since 1980s', the overall value of the return seems still low. This indicates the remaining effect of the central planned economy until the early 2000s. From the average statistics shown in Table 3-1 of Section 3.1, we see that still a large fraction of workers are in the state-owned enterprises, where their wages are strongly influenced by the government's central planning system. In 1988 38.7% of the sampled individuals are from state-owned enterprises, while this number is 27.0% in 1995 and 17.7% in 2002.

Although the RTE is lower than the world average, it is difficult to perform a ratio comparison between the values in China and the rest of the world. This is partially due to that calculating the absolute value in China is considered difficult, perhaps the same with the situations in other countries. As implied in the discussion presented in the literature review section, there are several sources for potential inaccuracies. Firstly, Li (Li, 2003) stressed that the education return is underestimated in China unless hourly wages is considered instead of annual wage. Specifically, the people with higher education levels tend to or are able to work fewer hours. Adjusting this effect, the education return is expected to be 5.5% instead of 4.7% in 1995, showing a 15% underestimation for previous calculation methods. Secondly, Zhang et. al. (2005) performed a more extensive calculation, adding various categories of dummy variables as will be done in later

sections. Their results show that the education returns are lower when the economic section, ownership and occupations are taken into account. The results obtained with CHIPS data is also systematically lower than the regression using data from the China's National Bureau of Statistics (Zhang et. al., 2005) covering the same period from 1988 to 2001. There is a systematic difference of approximately 1/3 over this period. Meanwhile, the results from Zhang et. al. (2005) using the other data source are also plotted in Figure 4-1 for comparison. We see that the trend is the same despite the difference in absolute value.

Through the analysis of the three years' data, it is found that the return of each additional year of schooling in urban China increased dramatically since 1980's to 2000's, which is evidently shown in Figure 4-1. While the absolute value may be of controversy, the steady increasing trend will be proved robust in later sections.

The reason for such dramatic increase is clearly the economic reform in China. Since the economic reform in China liberated the commodity market, there is no reason for the planning system still controls over the (at least the private) enterprises' right to determine their payments to the workers. There is strong motive for the hiring enterprises to attract highly skilled/well educated people with higher pays. Hence the RTE is expected to increase, and the income should be better explained by the human capital theory. However, even though the economic reform in urban China started in 1985 and it should have begin to penetrate into the earning system since then, the central planned economy

seems to play a role until now, which leads to a RTE that still lower than other countries. A large fraction of workers are in the state-owned, partially state-owned enterprises.

Observation 2: The RTEs of each year become lower when additional job category dummy variables are taken into account, but the increasing trend over different years is robust.

In the above OLS estimation using ordinary Mincer equation, no information regarding the categories of the jobs is considered. The RTE may be different in state owned and non-state owned enterprises and may also be different in new industries like communication and old industries like manufacturing. Adding the related job category dummy variables helps to answer these questions (Zhang et. al., 2005). By adding ownership and economic sector dummy variables into the ordinary Mincer equation, on one hand, we may test the robustness of the trend of the RTE changes over the years; on the other hand, we can test whether wage premiums occurs mainly within or between these job categories. The regression results are shown in Table 4-2. There are three regressions for each of the three years, which adds ownership alone, economic sector alone, and both of ownership and economic sector, respectively. The base group for ownership type is private and the base group for economic sector is service. The RTEs are also summarized in Table 4-3.

Variables	1988			1995			2002		
	I	II	III	I	II	III	I	II	III
Schooling	0.0284	0.0315	0.0290	0.0412	0.0416	0.0371	0.0649	0.0578	0.0600
	(41.28)	(43.76)	(40.71)	(25.98)	(24.32)	(21.49)	(30.94)	(22.97)	(28.07)
Experience	0.0347	0.0343	0.0346	0.0536	0.0510	0.0523	0.0272	0.0262	0.0277
	(47.58)	(46.17)	(47.41)	(31.39)	(28.94)	(30.15)	(11.49)	(9.37)	(11.77)
Experience squared	-0.0003	-0.0003	-0.0003	-0.0008	-0.0008	-0.0008	-0.0003	-0.0002	-0.0003
	(-18.42)	(-16.86)	(-18.11)	(-23.19)	(-20.16)	(-21.66)	(-4.43)	(-3.65)	(-4.85)
Male	0.0676	0.0727	0.0636	0.1204	0.1385	0.1244	0.1437	0.0976	0.1441
	(15.78)	(16.61)	(14.76)	(12.22)	(13.47)	(12.12)	(11.81)	(7.33)	(11.84)
Party member	0.0661	0.0745	0.0686	0.1507	0.1295	0.1251	0.1042	0.0687	0.0933
	(12.36)	(13.58)	(12.73)	(13.03)	(10.60)	(10.29)	(7.46)	(4.80)	(6.71)
Ethnic Minority	-0.0008	-0.0052	0.0007	-0.0471	-0.0563	-0.0517	0.0513	0.0241	0.0427
	(-0.08)	(-0.48)	(0.07)	(-2.02)	(-2.32)	(-2.15)	(1.72)	(0.75)	(1.44)
State Owned	-0.1425		-0.1487	-0.2256		-0.2783	0.0123		0.0349
	(-4.67)		(-4.87)	(-4.74)		(-5.71)	(0.67)		(1.79)
Local public	-0.2160		-0.2192	-0.3455		-0.3902	-0.1325		-0.1012
	(-7.07)		(-7.19)	(-7.34)		(-8.10)	(-8.59)		(-6.29)
Collective	-0.2832		-0.2881	-0.5191		-0.5368	-0.2975		-0.2618
	(-9.22)		(-9.39)	(-10.76)		(-10.88)	(-12.37)		(-10.79)
Agriculture		-0.0212	-0.0182		-0.0664	-0.0715		-01183	-0.0244
		(-0.99)	(-0.86)		(-1.77)	(-1.92)		(2.32)	(-0.47)
Manufacturing		-0.0013	0.0158		-0.1422	-0.1267		-0.2531	-0.1360
		(-0.24)	(3.00)		(-11.89)	(-10.54)		(-16.19)	(-8.73)
Mining		0.0641	0.0459		-0.0523	-0.1057		-0.3293	-0.2502
		(5.15)	(3.74)		(-1.12)	(-2.27)		(--7.25)	(-5.16)
Construction		0.0105	0.0204		-0.0983	-0.0967		-0.1488	-0.0236
		(0.88)	(1.74)		(-3.31)	(-3.26)		(-4.07)	(-0.69)
Transportation		0.0342	0.0357		0.0044	-0.0032		-0.0498	0.0349
		(4.27)	(4.06)		(0.19)	(-0.13)		(-2.08)	(1.79)
Commerce		-0.0342	-0.0178		-0.1448	-0.1250		-0.2824	-0.1832
		(-4.89)	(-2.57)		(-8.89)	(-7.67)		(-10.45)	(-9.39)

T-statistics are in parentheses. All errors are heteroskedasticity robust.

Table 4- 2. Regression results for ownership, economic sector and both.

Year	Ordinary Mincer	Add ownership	Add economic sector	Add both
1988	3.1%	2.8%	3.1%	2.9%
1995	4.7%	4.1%	4.2%	3.7%
2002	6.8%	6.5%	5.8%	6.0%

Table 4- 3. RTEs calculated with and without adding job categories as dummy variables.

In general we found that adding the new variables tends to decrease the overall RTE. This indicates the previously calculated RTE may be partially attributed to inter-job category differences. The regression with new variables also increases the R-squared values, which indicates the goodness-of-fit of the OLS regression. For regressions using CHIP-1988, the R-squared value increased from 0.4585 for the ordinary Mincer equation result to 0.4816 after adding ownership and economic sector variables. This shows that the data is better explained with job categories considered. This is also the cases for the later years, where the R-squared value increased from 0.2035 to 0.2364 in 1995 and from 0.1912 to 0.2229 in 2002. The R-squared value reported by Li (2003) ranged from 0.24 to 0.27, depending on regression details for CHIP-1995 data.

Besides these improvements, the increasing trend of RTE over the three years is shown to be robust. The RTE is 2.1 times higher in 2002 than 1988 after new variables are included, compared to a ratio of 2.2 without considering these variables. Even though, we need to note that some of the regressions for economic sectors are less significant in contrast to the much more reliable results consider the ownership. The above results

indicate that the increase of RTE was occurring in highly specific category of jobs during this period, and should root in the overall economic reform in China.

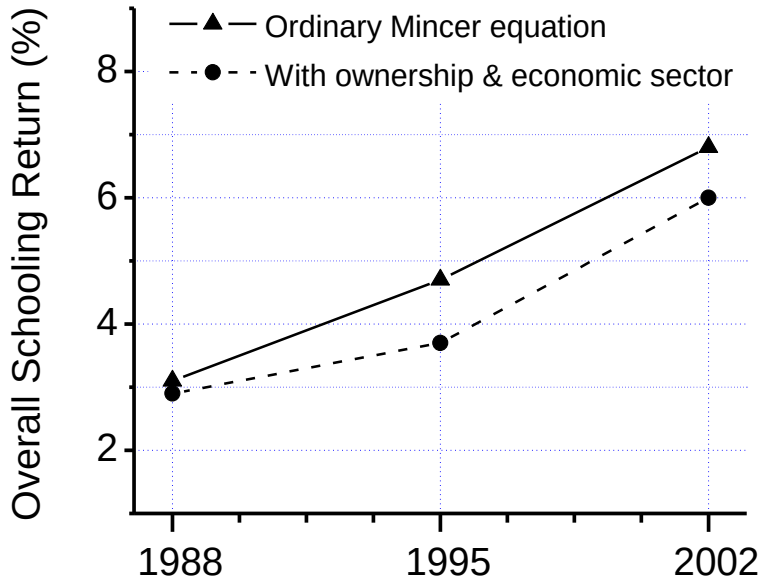

Figure 4-2. The increasing trend of returns to education for each schooling year with job categories as dummy variables. Zhao et. al.'s results are also plotted for comparison.

More insights may be obtained if we look into the changes of RTE by adding ownership and economic sector variables separately. In year 1988, the addition of ownership decreased the RTE by about 10%, from 3.1% to 2.8%, while the addition of economic sector basically didn't change the RTE. It seems that the inter-economic sector wage difference is small, at least smaller than the ownership effect. This is indeed the case as

reflected by the coefficients for different economic sectors for 1988-II in Table 4-2. The coefficient for different economic sectors ranged from -0.02 to +0.06, compared to the coefficient for the included ownership types that ranged from -0.14 to -0.28. In year 1995, the situation is different because both ownership and economic sector have significant effect on the RTE, as reflected by the coefficients in regressions of 1995-I &-II in Table 4-2. The combined effect is even more significant, reducing the RTE from 4.7% to 3.7%. In year 2002, the wage difference caused by economic sector became more significant than in different types of ownerships.

In a well-developed market, the result of full competition in labor market is wage equalization. But China's economic was under its government's control in the 1980's and then open to the world market gradually, thus it is interesting to see whether the economic development and the economic revelation have changed the return of education and have any reflections on different economic sectors. In 1988, according to the coefficients, compared with service, mining industry received a relatively lower wage, and all other industries received higher wage than service (mining received the lowest wage). Construction and transportation industries had the highest wage among these economic sectors. But till 1995, transportation became the highest wage industry. The wage of service increased dramatically, became the second higher among the 7 industries. And until 2002 the top two higher wage industries were still transportation and service. On average, in year 1988 the percentage of wage of commerce higher than that of service was 3.4%, according to regression 1988-II. But in 1995, wage of commerce became lower than service, the percentage was -13.5%, and until 2002, it was -24.6%. From the

result we can see that compared with wage of service, the wage of commerce decreased gradually.

According to these observations, the wage inequalities within different ownership types and economic sectors have different evolution traces over the period of time considered. The wage difference persisted within different ownership types since 1988, while the wage differences within economic sectors was minimum at the beginning but quickly and steadily grew to have a large effect on the overall RTE. This may indicate some important transition is happening during this period regarding the structure of economic sectors, and it should be interesting to further investigate the transition if more reliable data is available.

Observation 3: There had been a growing annual return to higher level educations in addition to the overall RTE increase.

During the calculation of the overall education return, the six years elementary education is included in the years of schooling. While the elementary education deliver the most basic skills such as reading and writing, it turned out that the elementary school experience provide little marginal return. As most people received such education, it provided little advantage during the competition. Taking the year 1995 dataset for example, about 95% of the sampled individuals received elementary or higher level educations. Therefore, the overall education return tends to underestimate the profitability of education in the later, more advanced educations after elementary school.

Variables	1988	1995	2002
College and up	0.4533	o.5174	0.8249
	(38.32)	(20.41)	(20.91)
Professional	0.3589	0.4457	0.5877
	(30.92)	(19.92)	(16.05)
Middle professional	0.2901	0.3709	0.4705
	(29.06)	(17.46)	(12.47)
Upper middle	0.2378	0.3092	0.3629
	(26.40)	(15.39)	(10.14)
Lower middle	0.1759	0.2122	0.1976
	(21.62)	(11.28)	(5.51)
Experience	0.0357	0.0531	0.0265
	(47.33)	(30.44)	(11.23)
Experience squared	-0.0003	-0.0008	-0.0002
	(-19.66)	(-21.05)	(-4.03)
Male	0.0637	0.1227	0.1396
	(14.80)	(12.05)	(11.50)
Party member	0.0654	0.1148	0.0568
	(12.15)	(9.47)	(4.04)
Ethnic minority	0.0003	-0.0413	0.0447
	(0.03)	(-1.74)	(1.52)
Agriculture	-0.0129	-0.0696	-0.0042
	(-0.61)	(-1.89)	(-0.08)
Manufacturing	0.0248	-0.1141	-0.1137
	(4.64)	(-9.45)	(-7.31)
Mining	0.0550	-0.1065	-0.2352
	(4.48)	(-2.33)	(-4.89)
Construction	0.0287	-0.0743	-0.0042
	(2.44)	(-2.54)	(-0.08)
Transportation	0.0462	0.0035	0.0560
	(5.24)	(0.15)	(2.57)
Commerce	-0.0063	-0.1089	-0.1605
	(-0.90)	(-6.66)	(-8.24)
State owned	-0.1476	-0.2701	0.0402
	(-4.85)	(-5.58)	(2.08)
Local public	-0.2162	-0.3843	-0.0920
	(-7.11)	(-8.04)	(-5.79)
Collective	-0.2841	-0.5199	-0.2408
	(-9.28)	(-10.61)	(-9.97)

T-statistics are in parentheses. All errors are heteroskedasticity robust.

Table 4- 4. Regression results for each education level.

	1988		1995		2002	
Overall RTE for each schooling year	**2.9%**		**3.7%**		**6.0%**	
Education level	Average return	Return of each education level	Average return	Return of each education level	Average return	Return of each education level
college	4.6%	56.8%	5.3%	68.2%	8.5%	127%
Professional school	4.6%	43.3%	5.8%	56.8%	7.6%	80.4%
Mid-professional	4.2%	33.6%	5.4%	44.8%	6.9%	60.0%
Up-middle	3.9%	25.9%	5.3%	36.3%	6.2%	43.3%
Low-middle	6.2%	19.7%	7.3%	23.4%	6.9%	22.1%
Weighted Average	**5.1%**		**6.1%**		**7.0%**	

Table 4- 5. RTEs calculated for each education level compared with RTEs of the overall schooling years.

Therefore, we would like to know the more quantitative returns to each level of educations after elementary school. And we are most interested in the ways that these returns changed over the years during the economic transformation. To achieve these goals, regressions are performed with detailed education level dummy variables in place of the total schooling years. The base group for comparison is those who received elementary education or below. Detailed results are listed in Table 4-4. The major results are summarized in Table 4-5.

Further processing for the dummy variable coefficients obtained in the regression is needed to obtain more intuitive numbers. First the percentage change in wage d_i for group i relative to the base group, which is the group with an elementary education or lower, is calculated. Using the coefficient for education dummy variable β_i, the percentage change is calculated as: $d_i = e^{\beta_i} - 1$. To calculate the average annual returns at each education level, I have used the return at each education level and the number of years required upon finishing elementary school. The average annual return is the calculated based on the geometric mean. If a college graduate earns 56.8% more than the base group, the annual education return is calculated as: $(1 + 56.8\%)^{1/10}$=1.046, where 10 is the additional years to get a college degree after elementary school. The numbers of additional years for finish each higher degree of educations is: 3, 6, 7, 8, and 10 for lower-middle school up to college. The above evaluation is biased since the 10 years of educations includes 3 years of lower middle school and 3 years of upper middle school, which all have different RTEs of themselves. Even though, such definition was proven useful for comparisons between different years where the bias applies to all of the evaluations (Li, 2003). For the 2002 results, the *college* group actually includes college graduates and up. This may bias the return toward a higher value. Similar problems should exist in 1988 and 1995 dataset, which was not fully clarified in the code books. We therefore expect the error to be consistent over the three years and still reflect the correct trend. The calculation results for all education levels over the three years' data are summarized in Table 4-5.

We observe the following facts from the results: Firstly, because the RTEs of post elementary educations are all significantly larger than the overall RTE for all schooling years, the low RTE for elementary education is confirmed. This was the case for all the years considered. Secondly, the RTEs averaged after elementary school show a steady growth, which are 5.1%, 6.1% and 7.0% for the three years. This is in accordance with the results based on the overall schooling year. Thirdly, and most importantly, the education returns for higher education levels increased over the period. While a college graduate earns approximately 1.5 times an elementary graduate in 1988, now they earn more than twice in 2002. The annual RTE for college education is 37% higher than the annual RTE for up-middle school in 2002, while this number is only 18% in 1988. It seems that the higher education levels were becoming more and more rewarding during this period. This seems in accordance with the economic transformation in China, where the continuous industrialization and upgrade required better education background.

A noticeable fact is that, in 1995, there seems to be a setback in rewarding educated workers. The average return for college education (5.3%) became lower than that of professional school (5.8%) or even middle professional school (5.4%). I feel that the results shown here have to be considered together with the increasing volume of college graduate during this period. Actually, the fraction of college graduates and above had almost doubled, from 12.6% in 1988 to 21.6% in 1995(Zhang, et. al. 2005). The greater number of college graduates would certainly change the supply and demand relation, and may be the most significant reason for this seemingly setback in the returns to higher education. In 2002, the fraction of *college graduates and higher* further grew to 28.1%.

The yearly RTE of college education of 8.5% now seems more significant, considering this increasing fraction.

There is another possible explanation for the higher rewarding to the professional education in the 1995 period. The professional school (including mid-level professional) educations focus more on the practical skills. These skills are perhaps favored during the certain period of the economic transition in China. While manufacturing is the majority industry, workers who are equipped with practical skills may provide the immediate profit to the enterprises compared to those equipped with more fundamental knowledge, like a graduate student. Indeed, we find that the fraction of workers in the manufacturing industry increased from 24.4% to 41.2% from 1988 to 1995. This is a significant expansion if the data sampling is not significantly biased or the way of dividing industries are not significantly changed. It is then not surprising that there is a huge increase in the demand of the workers with practical skills. Further combined analysis using income information and economic structure information will be an interesting way to answer the questions above.

The significant change in the rewarding structure of education till 2002 should also be closely related to the economic transformation. The gradually recognized importance of high level education may be related to the upgrade of the industries. In order for China to be continuously competitive in the world market, the exploration of human capital becomes increasingly important. According to Lu and Jiang's paper (2008), 1996 is a very important year for China's economic developing. Before 1996, economic reform is

less matured, and wage growth is very low; after 1996, the economic reform is deeper and entered WTO in 2000.

Observation 4: Ownership effects

During the process of economic transformation, the property right shifted in large scale as may be partly reflected by the relative amount of workers sampled in different types of ownerships, as shown previously in Table 3-1. The ratio of the number of workers in state owned to local public owned enterprises significantly decreased since 1995. However, as a legacy of the central planned economy, the state owned enterprises remain in large scale and in key economic sectors.

In earlier analysis, I have observed that adding ownership variables lowers the RTE of each schooling year. This indicates that the wage difference is partially due to the inter-ownership difference. Looking into the data of the three years in Table 4-2, we observe, from the coefficients, that workers in state-owned companies earn significantly more than the collective enterprises. Interestingly, although the fraction of state-owned workers decreased, the wage ratio between the two types of ownerships (state-owned vs. collective) increased from ~15% in 1988 to 35% in 2002.

I therefore continued the analysis by performing separate regressions using the sub-samples of the data, i.e. for state-owned workers and non-state owned workers, respectively. Detailed results are organized in Table 4-6. Major results are summarized in Table 4-7. The percentages in the Table 4-7 indicate the percentage increase of the wages

with corresponding education levels compared with the base group (elementary education or lower).

variables	1988		1995		2002	
	State	Non-state	State	Non-state	State	Non-state
College and up	0.4466 (24.65)	0.4780 (29.02)	05082 (12.42)	0.5564 (17.06)	0.7273 (6.53)	0.8460 (19.94)
Professional	0.3435 (18.44)	0.3897 (25.89)	0.3787 (9.62)	0.5120 (18.99)	0.5930 (5.77)	0.5925 (15.05)
Middle professional	0.2757 (16.95)	0.3208 (25.05)	0.3286 (8.69)	0.4206 (16.53)	0.4191 (3.98)	0.4776 (11.75)
Upper middle	0.2275 (14.81)	0.2571 (23.01)	0.2926 (7.75)	0.3415 (14.42)	0.3651 (3.63)	0.352 (9.23)
Lower middle	0.1695 (11.94)	0.1859 (18.61)	0.2926 (6.56)	0.2200 (9.88)	0.2725 (2.71)	0.1753 (4.54)
Experience	0.0363 (29.84)	0.0353 (36.49)	0.0499 (17.19)	0.0527 (24.35)	0.0359 (5.31)	0.0242 (9.56)
Experience squared	-0.0003 (-12.69)	-0.0003 (-14.83)	-0.0008 (-12.24)	-0.0008 (-16.85)	-0.0005 (-3.24)	-0.0002 (-2.86)
Male	0.0739 (10.41)	0.0648 (11.83)	0.1150 (6.56)	0.1315 (10.55)	0.1120 (3.32)	0.1493 (11.42)
Party member	0.0564 (6.90)	0.0779 (10.74)	0.0682 (3.53)	0.1424 (9.32)	0.0456 (1.28)	0.0603 (3.93)
Ethnic minority	0.0116 (0.59)	-0.0030 (-0.23)	0.0811 (1.80)	-0.0686 (-2.43)	0.1725 (1.79)	0.0312 (1.00)
Agriculture	-0.0280 (-0.87)	-0.0029 (-0.10)	0.0975 (1.83)	-0.178 (-3.60)	-0.1801 (-0.71)	-0.0147 (-0.27)
Manufacturing	0.0171 (2.04)	0.0183 (2.62)	-0.0925 (-4.66)	-0.1379 (-9.26)	-0.1507 (-3.93)	-0.1529 (-9.39)
Mining	0.0540 (3.48)	0.0418 (1.94)	-0.0968 (-1.95)	-0.1136 (-1.32)	-0.3056 (-4.66)	-0.2642 (-3.84)
Construction	0.0279 (1.58)	0.0131 (0.82)	-0.1323 (-2.81)	-0.0565 (-1.54)	-0.1071 (-1.61)	-0.0234 (-0.60)
Transportation	0.0478 (3.73)	0.0405 (3.27)	0.0330 (0.97)	-0.0239 (-0.76)	0.0148 (0.32)	0.0355 (1.34)
Commerce	0.0072 (0.60)	-0.0174 (-1.98)	-0.1150 (-3.32)	-0.1115 (-5.84)	-0.1307 (-1.48)	-0.1719 (-8.29)

T-statistics are in parentheses. All errors are heteroskedasticity robust

Table 4-6. Regression results for state-owned and non-state-owned enterprises respectively.

We see that the RTEs are generally larger in the non-state owned sectors than in the state owned sector, as reflected by the higher percentage numbers at the same education levels in Table 4-7. In 1988, the RTEs in non-state owned enterprises are higher than those of the state-owned at every educational level above elementary school. While the RTEs of non-state-owned is higher starting from upper middle school in 1995, and starting from mid-professional school starting in 2002. Considering the rewarding structure in different educational levels, the RTEs is steeper change in the non-state-owned enterprises.

	1988		1995		2002	
	Stateowned	Nonstateowned	Stateowned	Nonstateowned	Stateowned	Nonstateowned
Collegegrad	44.7%	47.9%	50.8%	55.6%	72.7%	84.6%
Professional	34.3%	39.0%	37.9%	51.2%	59.3%	59.3%
Midprofessional	27.6%	32.1%	32.9%	42.1%	41.9%	47.8%
Upmiddle	22.8%	25.7%	29.3%	34.2%	36.5%	35.5%
Lowmiddle	16.9%	18.6%	23.3%	22.0%	27.2%	17.5%

Table 4-7. RTEs calculated with workers from the state owned and non-state owned enterprises, separately, in the three years.

This reflects the different levels of marketization in the state-owned sector and the non-state-owned sectors. In the non-state-owned sectors, the marketization is more complete as the reform progresses, both for commodity market and human capital market. The structure RTE changed significantly since 1988 with higher educational levels growingly rewarded. While for the state-owned sectors, the marketization lagged behind. Taking the banking sector for example. Although the Law of Commercial Banks was issued in 1995, there lacks competition in the market because the four major state-owned banks takes

almost all the market share, each controlling a different economic sector. Similar situation in the telecommunication sector, where the two major state-owned companies Telenet and Telecom took all the market share. The slow progress in human capital market of the state-owned enterprises companied. Central planning is still playing an important role. Although the rewarding structure changed during the reform, the change is noticeably slower than that of the non-state-owned sectors, as reflected by Table 4-7.

Observation 5: Geographic effects

It is natural to think if the geographic locations would be related to the wage inequality. This effect is potentially important since the economic structure and scale in different provinces in China had been stable due to many geographic and historical reasons. The data sampling of CHIPS considered such effects as discussed in the data description section. Here we analyze the 1995 and 2002 data using another set of regression, focusing on the wage inequality among different provinces. The detailed results are summarized in Table 4-8, and major results summarized in Table 4-9.

The following equation is used during the regression:

$$lnwage_i = \beta_0 + \beta_1 \text{schooling}_i^p + \beta_2 \text{sex}_i^p + \beta_3 \text{partymember}_i^p + \beta_4 ethnicminority_i^p + \beta_5 experience_i^p + \beta_6 \text{experiencesq}_i^p$$

In the above equation, i stand for year 1995 and 2002; p stands for different provinces: Beijing, Anhui, Guangdong, and Gansu. All the wages were collected from the working people at that year, and in four different provinces and city.

variables	1995				2002			
	Beijing	Anhui	Guangdong	Gansu	Beijing	Anhui	Guangdong	Gansu
Schooling	0.0422	0.0411	0.0453	0.0556	0.0696	0.0682	0.0711	0.0772
	(23.18)	(7.05)	(7.34)	(8.09)	(9.76)	(8.96)	(9.20)	(8.30)
Male	0.1179	0.1515	0.1019	0.1505	0.2084	0.2312	0.1820	0.1539
	(10.96)	(4.51)	(2.54)	(3.60)	(6.17)	(5.27)	(4.42)	(3.28)
Party member	0.1082	0.0996	0.1486	0.1004	0.0426	0.1291	0.2077	0.1226
	(8.24)	(2.33)	(3.11)	(1.95)	(1.07)	(2.56)	(4.37)	(2.18)
Ethnic minority	-0.0501	0.0111	-0.3689	0.0146	-0.0381	-0.0511	0.4525	-0.0535
	(-1.96)	(0.08)	(-3.94)	(0.15)	(-0.51)	(-0.31)	(2.26)	(-0.40)
Experience	0.0513	0.0497	0.0567	0.0629	0.0028	0.0529	0.0457	0.0369
	(26.76)	(8.61)	(8.04)	(8.54)	(0.45)	(6.14)	(5.46)	(4.10)
Experience squared	-0.0007	-0.0007	-0.0010	-0.0008	0.0001	-0.0008	-0.0009	-0.0004
	(-15.32)	(-5.05)	(-5.61)	(-4.59)	(0.70)	(-3.97)	(-4.28)	(-1.96)

T-statistics are in parentheses. All errors are heteroskedasticity robust.

Table 4-8. Regression results for Geographic effects.

Four provinces are chosen for further calculation in this section. They are Guangdong and Beijing that represent the more developed provinces, and Gansu and Anhui represent the less developed provinces. Among them, Guangdong has the highest GDP and is the most developed province in China. The GDP per capita of Guangdong was 11143 Yuan in year 1998, also the highest in China (except for Beijing and Shanghai, which are municipality cities directly under the Central Government). Anhui and Gansu are two of the lowest developed provinces with the GDP per capita of 4576 Yuan and 3456 Yuan in year 1998, respectively, which are among the lowest five provinces (Comprehensive Statistical Data

and Materials on 50 Years of New China). The differences in economic development level are also partly reflected through the constants of the OLS regression, assuming a good correlation of GDP per capita and income. These constants were found to be 8.0 for Beijing, 8.1 for Guangdong, 7.3 for Anhui, and 6.9 for Gansu in year 1995; and 8.6 for Beijing, 8.2 for Guangdong, 7.5 for Anhui, and 7.5 for Gansu in year 2002.

	1995	**2002**
Average	3.1%	6.8%
Beijing	3.1%	6.9%
Anhui	4.1%	6.8%
Guangdong	4.5%	7.1%
Gansu	5.6%	7.7%

Table 4-9. RTEs calculated using subsamples from different provinces

From Table 4-9, we first confirm again the increase of RTE in each individual province, indicating the robustness regarding geographic location. However, among the four provinces under consideration, Gansu experienced a relatively slower increase in the RTE, while the RTE of Beijing more than doubled. In terms of increasing rate of education return during the years between 1997 and 2002, Beijing showed the most significant growth, with a 125.8% increase from 3.1% to 6.0%. It is followed by Anhui and Guangdong, with percentages of 65.9% and 57.8%, respectively. Gansu had the lowest increase of 37.5%.

Secondly, comparing RTEs of different provinces in the same year, we observe significant difference. It is interesting to see that Gansu province had the highest return of

education instead of the more developed provinces, i.e. the average return of schooling for each of these four provinces is not positively correlated to the GDP per capita. From the result of regression shows that Gansu province had the highest return of schooling in both years, being 5.6% in1995 and 7.7% in 2002. In 1995, Beijing was the province that had the lowest education return of 3.1%. To explain the observation, we note that Guangdong is the most developed province in China, providing both better working opportunities and working environment. Thus it is easier for Guangdong to attract more capable people. It is more advantageous for the demand side in the human capital market especially for the workforce with higher education level and leaving them a lower wage premium. In contrast, Gansu province located in the west inner land China, which is considered as much less developed. It is harder to attract higher education level people to devote their lives in Gansu.

Meanwhile, due to the different rate of change regarding the RTE, the differences among provinces were being smoothed over the years. After 1995, the return of schooling of Beijing increased quickly to 6.9% in 2002. Beijing also surpassed Anhui, though still lower than Guangdong. This is probably due to the increased mobility in the labor market, especially among the metropolitan cities including Beijing and Guangzhou. The increased mobility makes it difficult for individual cities to maintain either a significantly lower or higher RTE.

Other observations:

The CHIPS data clearly provide an overwhelming amount of information for many kinds of potential analysis. One important potential analysis is regarding the intertwined transformation of the political and market systems. During the analysis of the political transformation, the party member information in these datasets is widely used, because the Chinese Communist Party (CCP) is the sole ruling party in China. Under the scope of the current analysis, we included the *party member* as a dummy variable to see its effect on the wages. Within such simplest form of analysis, we found that party members do have higher wages. But the change in this wage premium is neither simply upward nor downward. It was the highest in the 1995 data, but lower in both 1988 and 2002. This trend is robust while adding different types of variables, regardless if these variables are schooling or education level, job categories or geographic regions. Further analysis will be interesting. We also found that ethnic minority plays an insignificant role in determining wage premium.

CHAPTER 5: CONCLUSIONS

In summary, we have studied several issues regarding the returns to educations (RTE) in China during the period of 1988 to 2002 using data from Chinese Household Income Project Survey (CHIPS). Interesting behaviors of the RTEs during these years echo with the sustained high speed economic growth and significant economic transformation occurred in this time period in China.

Specifically, the major observations and implications are summarized as follows:

1) There was a significant increase in the RTE, from 3.1% to 6.8% in the sense of overall RTE for each additional schooling year. This is in accordance with the marketization transition in the human capital market, together with the commodity market in this period in China.
2) The increasing trend of RTE in this period is shown to be robust, when the wage differences due to ownership, economic sector or geographic location of the enterprises are taken into account. Adding the above variables or distinguishing the above sub-samples would reduce the RTEs to the certain extent, but does not affect the rising trend.
3) The RTE structure in the sense of education level changed during this period. Overall, the higher level educations, especially college above, had a steady

growing annual return in this period. Specifically, the way that RTE of each education level grows differs and is likely to be affected by many economic and policy factors.

4) The RTE was different in enterprises of different ownership, although the increasing trend is still robust for all of them. State owned generally had smaller RTE compared to those of the non-state owned enterprises throughout the years covered by this study. This indicates that the marketization process in the state-owned sector lagged behind that of the non-state-owned sector.
5) The increase trend of RTE is also robust in different provinces. The rates of increase for different provinces appear as they were smoothing the RTE differences among provinces. Whether this reflects the increasing mobility of the human capital could be an interesting question.

The growing RTE should be the result of marketization process of human capital in China, due to the economic reform starting from the early 1980s. Since a certain level of RTE is expected to realize more effective allocation of human capital resource, that marketization of human capital should be and will continue to be an important factor for a sustained growth of China's economy. It will play an important incentive role for individuals to seek higher education and realize their personal values. The return to education is related to a lot of economic topics, and therefore could be analyzed together with other economic data. Such simultaneous analysis should provide even richer information for the better understanding of the economic transition in China, and provide more valuable evidence during the related policy making of the government.

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APPENDIX

Year 1988- Schooling RTE with Ordinary Mincer equation:

Source	SS	df	MS		Number of obs = 16608
					F(6, 16601) = 2343.03
Model	998.213108	6	166.368851		Prob > F = 0.0000
Residual	1178.7682	16601	.071005855		R-squared = 0.4585
					Adj R-squared = 0.4583
Total	2176.9813	16607	.131088174		Root MSE = .26647

lnwages	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
schooling	.0313446	.0006889	45.50	0.000	.0299942	.032695
experience	.0343037	.0007446	46.07	0.000	.0328442	.0357632
experiencesq	-.0002597	.0000154	-16.82	0.000	-.00029	-.0002295
male	.0774243	.004347	17.81	0.000	.0689037	.085945
partymember	.0742062	.0054408	13.64	0.000	.0635417	.0848707
ethnicmino~y	-.0069652	.0109706	-0.63	0.526	-.0284687	.0145384
_cons	3.425268	.0105736	323.95	0.000	3.404543	3.445994

Year 1988- Schooling RTE with ownership:

Source	SS	df	MS		Number of obs = 16608
					F(9, 16598) = 1701.21
Model	1044.58537	9	116.065042		Prob > F = 0.0000
Residual	1132.39593	16598	.068224842		R-squared = 0.4798
					Adj R-squared = 0.4795
Total	2176.9813	16607	.131088174		Root MSE = .2612

lnwages	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
schooling	.0283987	.0006879	41.28	0.000	.0270504	.029747
experience	.0347371	.0007301	47.58	0.000	.033306	.0361683
experiencesq	-.0002792	.0000152	-18.42	0.000	-.0003089	-.0002495
male	.0675648	.0042826	15.78	0.000	.0591704	.0759592
partymember	.0660826	.0053481	12.36	0.000	.0555997	.0765655
ethnicmino~y	-.0008456	.0107628	-0.08	0.937	-.0219418	.0202506
stateowned	-.1425144	.0305422	-4.67	0.000	-.2023803	-.0826485
localpublic	-.2160288	.0305374	-7.07	0.000	-.2758855	-.1561722
collective	-.2832776	.0307225	-9.22	0.000	-.3434968	-.2230583
_cons	3.659176	.0320491	114.17	0.000	3.596357	3.721996

Year 1988- Schooling RTE with economic sector:

Source	SS	df	MS	Number of obs = 16608
Model	1004.75531	12	83.7296095	F(12, 16595) = 1185.35
Residual	1172.22599	16595	.0706373	Prob > F = 0.0000
				R-squared = 0.4615
				Adj R-squared = 0.4611
Total	2176.9813	16607	.131088174	Root MSE = .26578

lnwages	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
schooling	.031459	.000719	43.76	0.000	.0300498	.0328682
experience	.0343442	.0007439	46.17	0.000	.032886	.0358024
experiencesq	-.0002607	.0000155	-16.86	0.000	-.000291	-.0002304
male	.0726738	.0043742	16.61	0.000	.0640998	.0812478
partymember	.0744763	.005484	13.58	0.000	.0637271	.0852255
ethnicmino~y	-.0052142	.010965	-0.48	0.634	-.0267068	.0162785
agriculture	-.0211532	.0214307	-0.99	0.324	-.0631596	.0208532
manufactur~g	-.0012928	.0053115	-0.24	0.808	-.0117039	.0091183
mining	.0640785	.0124492	5.15	0.000	.0396768	.0884803
construction	.0104726	.0119353	0.88	0.380	-.0129218	.0338671
transporta~n	.0382845	.0089668	4.27	0.000	.0207087	.0558603
commerce	-.0341548	.0069794	-4.89	0.000	-.0478352	-.0204743
_cons	3.426883	.0118947	288.10	0.000	3.403568	3.450198

Year 1988- Schooling RTE with ownership & economic sector:

Source	SS	df	MS	Number of obs = 16608
Model	1048.50094	15	69.9000624	F(15, 16592) = 1027.74
Residual	1128.48037	16592	.068013523	Prob > F = 0.0000
				R-squared = 0.4816
				Adj R-squared = 0.4812
Total	2176.9813	16607	.131088174	Root MSE = .26079

lnwages	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
schooling	.0290436	.0007134	40.71	0.000	.0276454	.0304419
experience	.0346135	.0007301	47.41	0.000	.0331824	.0360446
experiencesq	-.000275	.0000152	-18.11	0.000	-.0003048	-.0002452
male	.0636449	.0043134	14.76	0.000	.0551901	.0720997
partymember	.0686149	.005389	12.73	0.000	.058052	.0791779
ethnicmino~y	.0007283	.010768	0.07	0.946	-.0203781	.0218346
agriculture	-.018158	.0210295	-0.86	0.388	-.059378	.023062
manufactur~g	.0158141	.0052778	3.00	0.003	.0054691	.0261591
mining	.0459247	.0122699	3.74	0.000	.0218744	.0699749
construction	.0204395	.0117436	1.74	0.082	-.0025792	.0434581
transporta~n	.0357121	.008804	4.06	0.000	.0184553	.0529689
commerce	-.0177561	.0068972	-2.57	0.010	-.0312754	-.0042367
stateowned	-.1487305	.030544	-4.87	0.000	-.2086	-.088861
localpublic	-.2192802	.0305191	-7.19	0.000	-.2791008	-.1594595
collective	-.2881074	.0306907	-9.39	0.000	-.3482644	-.2279503
_cons	3.651061	.0325914	112.03	0.000	3.587178	3.714943

Year 1988- education level RTE with ownership & economic sector:

Source	SS	df	MS	Number of obs =	16608
				F(19, 16588) =	823.40
Model	1056.63128	19	55.6121725	Prob > F =	0.0000
Residual	1120.35003	16588	.067539789	R-squared =	0.4854
				Adj R-squared =	0.4848
Total	2176.9813	16607	.131088174	Root MSE =	.25988

lnwages	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
college	.4532872	.0118294	38.32	0.000	.4301003	.476474
professional	.3588814	.0116068	30.92	0.000	.3361308	.381632
midprofess~l	.2901193	.009983	29.06	0.000	.2705514	.3096871
upmiddle	.237815	.0090066	26.40	0.000	.2201612	.2554688
lowmiddle	.1758839	.0081335	21.62	0.000	.1599412	.1918265
experience	.0356525	.0007533	47.33	0.000	.034176	.0371291
experiencesq	-.0003091	.0000157	-19.66	0.000	-.0003399	-.0002782
male	.063734	.004307	14.80	0.000	.0552919	.0721762
partymember	.0654387	.0053877	12.15	0.000	.0548782	.0759992
ethnicmino~y	.0003096	.0107316	0.03	0.977	-.0207256	.0213448
agriculture	-.0128556	.0209707	-0.61	0.540	-.0539604	.0282492
manufactur~g	.0247797	.0053438	4.64	0.000	.0143052	.0352542
mining	.0550075	.0122661	4.48	0.000	.0309647	.0790503
construction	.0286637	.0117343	2.44	0.015	.0056632	.0516641
transporta~n	.046257	.0088348	5.24	0.000	.0289398	.0635742
commerce	-.006295	.0069745	-0.90	0.367	-.0199658	.0073758
stateowned	-.1476539	.0304499	-4.85	0.000	-.207339	-.0879688
localpublic	-.2162127	.0304283	-7.11	0.000	-.2758554	-.15657
collective	-.2841278	.030602	-9.28	0.000	-.344111	-.2241445
_cons	3.678851	.0326527	112.67	0.000	3.614848	3.742853

Year 1988-State-owned

Source	SS	df	MS	Number of obs =	6643
				F(16, 6626) =	353.18
Model	402.006674	16	25.1254171	Prob > F =	0.0000
Residual	471.37887	6626	.071140789	R-squared =	0.4603
				Adj R-squared =	0.4590
Total	873.385544	6642	.131494361	Root MSE =	.26672

lnwages	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
college	.4466055	.0181181	24.65	0.000	.4110881	.4821229
professional	.3434806	.0186301	18.44	0.000	.3069597	.3800015
midprofess~l	.2757196	.016268	16.95	0.000	.2438291	.30761
upmiddle	.2275292	.0153638	14.81	0.000	.1974113	.2576472
lowmiddle	.1694634	.0141972	11.94	0.000	.1416322	.1972946
experience	.0362996	.0012165	29.84	0.000	.0339149	.0386843
experiencesq	-.0003227	.0000254	-12.69	0.000	-.0003725	-.0002729
male	.072993	.0070102	10.41	0.000	.0592507	.0867352
partymember	.0564266	.0081763	6.90	0.000	.0403983	.0724549
ethnicmino~y	.0115615	.0194322	0.59	0.552	-.0265318	.0496548
agriculture	-.0280048	.0322226	-0.87	0.385	-.0911713	.0351618
manufactur~g	.0170771	.0083652	2.04	0.041	.0006786	.0334757
mining	.0540301	.0155047	3.48	0.000	.023636	.0844243
construction	.0279456	.0176952	1.58	0.114	-.0067427	.0626339
transporta~n	.0478085	.0128197	3.73	0.000	.0226778	.0729392
commerce	.0071953	.011972	0.60	0.548	-.0162736	.0306642
_cons	3.532201	.019552	180.66	0.000	3.493872	3.570529

Year 1988-Non-state-owned

Source	SS	df	MS	Number of obs =	9965
Model	561.985808	16	35.124113	F(16, 9948) =	528.67
Residual	660.929698	9948	.06643845	Prob > F =	0.0000
				R-squared =	0.4595
				Adj R-squared =	0.4587
Total	1222.91551	9964	.122733391	Root MSE =	.25776

lnwages	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
college	.4779631	.0164692	29.02	0.000	.4456802	.510246
professional	.3897124	.0150523	25.89	0.000	.3602069	.4192179
midprofess~l	.3208443	.0128086	25.05	0.000	.2957369	.3459517
upmiddle	.2570978	.0111733	23.01	0.000	.2351958	.2789997
lowmiddle	.1858778	.0099906	18.61	0.000	.1662941	.2054615
experience	.0354355	.0009711	36.49	0.000	.033532	.037339
experiencesq	-.0003002	.0000202	-14.83	0.000	-.0003399	-.0002606
male	.0648061	.0054801	11.83	0.000	.0540639	.0755483
partymember	.0779083	.0072546	10.74	0.000	.0636878	.0921288
ethnicmino~y	-.0030185	.0129341	-0.23	0.815	-.0283721	.022335
agriculture	-.0028526	.0279655	-0.10	0.919	-.0576706	.0519654
manufactur~g	.0183291	.0069845	2.62	0.009	.004638	.0320202
mining	.0417559	.0214709	1.94	0.052	-.0003315	.0838432
construction	.013052	.0158358	0.82	0.410	-.0179894	.0440933
transporta~n	.040525	.0124038	3.27	0.001	.0162111	.0648389
commerce	-.0173548	.0087441	-1.98	0.047	-.034495	-.0002147
_cons	3.429264	.015546	220.59	0.000	3.398791	3.459738

Year 1995- Schooling RTE with Ordinary Mincer equation:

Source	SS	df	MS	Number of obs =	13719
Model	1078.03405	6	179.672342	F(6, 13712) =	584.24
Residual	4216.8408	13712	.30752923	Prob > F =	0.0000
				R-squared =	0.2036
				Adj R-squared =	0.2033
Total	5294.87485	13718	.385980088	Root MSE =	.55455

lnwages	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
schooling	.0469988	.001562	30.09	0.000	.043937	.0500606
experience	.0503468	.0016834	29.91	0.000	.0470471	.0536464
experiencesq	-.0007681	.000036	-21.32	0.000	-.0008387	-.0006974
male	.1356697	.0098911	13.72	0.000	.1162818	.1550576
ethnicmino~y	-.0521691	.0235557	-2.21	0.027	-.0983416	-.0059967
partymember	.1592462	.0116347	13.69	0.000	.1364406	.1820517
_cons	7.358967	.0259466	283.62	0.000	7.308108	7.409826

Year 1995- Schooling RTE with ownership:

Source	SS	df	MS	Number of obs =	13528
Model	1188.41035	9	132.045594	F(9, 13518) =	442.46
Residual	4034.21976	13518	.298433183	Prob > F =	0.0000
				R-squared =	0.2276
				Adj R-squared =	0.2270
Total	5222.63011	13527	.386089311	Root MSE =	.54629

lnwages	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
schooling	.0412316	.0015868	25.98	0.000	.0381213	.0443419
experience	.052599	.0016756	31.39	0.000	.0493146	.0558834
experiencesq	-.0008311	.0000358	-23.19	0.000	-.0009013	-.0007608
male	.1203524	.0098464	12.22	0.000	.101052	.1396528
ethnicmino~y	-.0471412	.0233035	-2.02	0.043	-.0928193	-.0014632
partymember	.1506743	.0115621	13.03	0.000	.1280109	.1733377
stateowned	-.2255978	.0475602	-4.74	0.000	-.3188225	-.1323731
localpublic	-.3455398	.0470888	-7.34	0.000	-.4378405	-.2532392
collective	-.5190985	.0482604	-10.76	0.000	-.6136956	-.4245014
_cons	7.751357	.0519346	149.25	0.000	7.649558	7.853156

Year 1995- Schooling RTE with economic sector:

Source	SS	df	MS	Number of obs =	12598
Model	1052.82649	12	87.7355406	F(12, 12585) =	289.87
Residual	3809.10686	12585	.30267039	Prob > F =	0.0000
				R-squared =	0.2165
				Adj R-squared =	0.2158
Total	4861.93335	12597	.385959621	Root MSE =	.55015

lnwages	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
schooling	.041552	.0017084	24.32	0.000	.0382033	.0449006
experience	.0509773	.0017615	28.94	0.000	.0475245	.0544302
experiencesq	-.0007788	.0000386	-20.16	0.000	-.0008545	-.0007031
male	.1384567	.0102807	13.47	0.000	.118305	.1586084
ethnicmino~y	-.0562798	.0242618	-2.32	0.020	-.1038366	-.0087229
partymember	.1294962	.0122221	10.60	0.000	.105539	.1534534
agriculture	-.0663694	.0375355	-1.77	0.077	-.1399446	.0072059
manufactur~g	-.1422494	.0119639	-11.89	0.000	-.1657005	-.1187984
mining	-.0523357	.0466924	-1.12	0.262	-.14386	.0391886
construction	-.0983344	.0297262	-3.31	0.001	-.1566022	-.0400666
transporta~n	.0044236	.0238243	0.19	0.853	-.0422757	.0511229
commerce	-.1447585	.0162816	-8.89	0.000	-.176673	-.112844
_cons	7.508151	.029303	256.22	0.000	7.450713	7.56559

Year 1995- Schooling RTE with ownership & economic sector:

Source	SS	df	MS		
Model	1135.85924	15	75.7239495	Number of obs	= 12435
Residual	3668.13225	12419	.295364542	F(15, 12419)	= 256.37
				Prob > F	= 0.0000
Total	4803.99149	12434	.386359296	R-squared	= 0.2364
				Adj R-squared	= 0.2355
				Root MSE	= .54347

lnwages	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
schooling	.0371011	.0017261	21.49	0.000	.0337176	.0404845
experience	.0529923	.0017574	30.15	0.000	.0495475	.0564371
experiencesq	-.0008344	.0000385	-21.66	0.000	-.0009099	-.0007589
male	.1243504	.0102638	12.12	0.000	.1042317	.144469
ethnicmino~y	-.0517454	.0240572	-2.15	0.032	-.0989012	-.0045895
partymember	.1251149	.0121613	10.29	0.000	.1012768	.148953
stateowned	-.2783409	.0487047	-5.71	0.000	-.3738097	-.1828721
localpublic	-.3901687	.0481409	-8.10	0.000	-.4845323	-.295805
collective	-.5367723	.0493169	-10.88	0.000	-.633441	-.4401036
agriculture	-.071539	.0371833	-1.92	0.054	-.144424	.001346
manufactur~g	-.1267075	.0120215	-10.54	0.000	-.1502714	-.1031435
mining	-.1057	.0466476	-2.27	0.023	-.1971366	-.0142635
construction	-.0967188	.0296763	-3.26	0.001	-.154889	-.0385486
transporta~n	-.0031624	.0237404	-0.13	0.894	-.0496972	.0433724
commerce	-.1250408	.016297	-7.67	0.000	-.1569854	-.0930962
_cons	7.92022	.0548823	144.31	0.000	7.812642	8.027798

Year 1995- education level RTE with ownership & economic sector:

Source	SS	df	MS		
Model	1197.14697	19	63.0077354	Number of obs	= 12652
Residual	3711.35245	12632	.293805609	F(19, 12632)	= 214.45
				Prob > F	= 0.0000
Total	4908.49942	12651	.387992998	R-squared	= 0.2439
				Adj R-squared	= 0.2428
				Root MSE	= .54204

lnwages	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
college	.5174506	.0253567	20.41	0.000	.4677477	.5671535
professional	.4456566	.0223709	19.92	0.000	.4018063	.4895069
midprofess~l	.3709411	.0212432	17.46	0.000	.3293013	.4125809
upmiddle	.3091883	.0200895	15.39	0.000	.2698098	.3485668
lowmiddle	.2121852	.0188183	11.28	0.000	.1752986	.2490719
experience	.053096	.0017442	30.44	0.000	.0496771	.0565148
experiencesq	-.0008227	.0000383	-21.50	0.000	-.0008977	-.0007477
male	.1226542	.0101766	12.05	0.000	.1027066	.1426018
ethnicmino~y	-.0413455	.0238226	-1.74	0.083	-.0880413	.0053504
partymember	.1148467	.0121219	9.47	0.000	.0910859	.1386075
stateowned	-.2701403	.0483815	-5.58	0.000	-.3649753	-.1753052
localpublic	-.3842785	.0478231	-8.04	0.000	-.4780191	-.2905379
collective	-.5198679	.048994	-10.61	0.000	-.6159037	-.4238321
agriculture	-.069644	.0369301	-1.89	0.059	-.1420327	.0027447
manufactur~g	-.114072	.0120765	-9.45	0.000	-.1377437	-.0904003
mining	-.106539	.0457757	-2.33	0.020	-.1962662	-.0168117
construction	-.0742608	.0292064	-2.54	0.011	-.1315098	-.0170118
transporta~n	.0035392	.0236658	0.15	0.881	-.0428495	.0499278
commerce	-.1089147	.0163622	-6.66	0.000	-.1409872	-.0768423
_cons	7.986698	.0537547	148.58	0.000	7.88133	8.092065

Year 1995 -State-owned

Source	SS	df	MS	Number of obs =	3534
Model	226.395794	16	14.1497371	F(16, 3517) =	60.65
Residual	820.521342	3517	.23330149	Prob > F =	0.0000
				R-squared =	0.2162
Total	1046.91714	3533	.296325258	Adj R-squared =	0.2127
				Root MSE =	.48301

lnwages	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
college	.5081651	.0409294	12.42	0.000	.4279175	.5884128
professional	.3786893	.0393445	9.62	0.000	.301549	.4558297
midprofess~l	.3285806	.0378047	8.69	0.000	.2544593	.4027018
upmiddle	.2926401	.0377649	7.75	0.000	.2185968	.3666835
lowmiddle	.232572	.0354528	6.56	0.000	.1630618	.3020822
experience	.0499064	.0029025	17.19	0.000	.0442156	.0555972
experiencesq	-.0007561	.0000618	-12.24	0.000	-.0008772	-.000635
male	.1149758	.0172959	6.65	0.000	.0810648	.1488869
ethnicmino~y	.0811483	.0450955	1.80	0.072	-.0072677	.1695644
partymember	.0682491	.0193298	3.53	0.000	.0303503	.1061478
agriculture	.0975069	.0532895	1.83	0.067	-.0069746	.2019883
manufactur~g	-.0924711	.0198491	-4.66	0.000	-.1313879	-.0535542
mining	-.0967977	.0496305	-1.95	0.051	-.1941052	.0005098
construction	-.1323104	.0470103	-2.81	0.005	-.2244807	-.0401401
transporta~n	.0330475	.0340498	0.97	0.332	-.0337119	.0998069
commerce	-.1150447	.0346892	-3.32	0.001	-.1830577	-.0470317
_cons	7.767638	.049051	158.36	0.000	7.671467	7.863809

Year 1995-Non-state-owned

Source	SS	df	MS	Number of obs =	9118
Model	817.931781	16	51.1207363	F(16, 9101) =	159.45
Residual	2917.8675	9101	.320609548	Prob > F =	0.0000
				R-squared =	0.2189
Total	3735.79928	9117	.409761904	Adj R-squared =	0.2176
				Root MSE =	.56622

lnwages	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
college	.556414	.0326229	17.06	0.000	.4924659	.6203622
professional	.5120186	.0269693	18.99	0.000	.4591528	.5648844
midprofess~l	.420562	.0254434	16.53	0.000	.3706871	.4704368
upmiddle	.3415325	.0236825	14.42	0.000	.2951095	.3879554
lowmiddle	.2199538	.0222717	9.88	0.000	.1762961	.2636114
experience	.0526716	.0021634	24.35	0.000	.0484309	.0569123
experiencesq	-.0008105	.0000481	-16.85	0.000	-.0009048	-.0007162
male	.1315086	.0124617	10.55	0.000	.1070809	.1559362
ethnicmino~y	-.0685863	.0282035	-2.43	0.015	-.1238715	-.013301
partymember	.1424075	.0152742	9.32	0.000	.1124666	.1723485
agriculture	-.1767592	.0491321	-3.60	0.000	-.2730692	-.0804492
manufactur~g	-.1379082	.0148891	-9.26	0.000	-.1670941	-.1087223
mining	-.113642	.0861274	-1.32	0.187	-.282471	.0551871
construction	-.0564522	.0366615	-1.54	0.124	-.128317	.0154125
transporta~n	-.0239401	.0315758	-0.76	0.448	-.0858358	.0379556
commerce	-.1115511	.019107	-5.84	0.000	-.1490051	-.0740971
_cons	7.556036	.0327864	230.46	0.000	7.491767	7.620304

Year 2002- Schooling RTE with Ordinary Mincer equation:

Source	SS	df	MS		Number of obs =	9451
					F(6, 9444) =	371.97
Model	737.159153	6	122.859859		Prob > F =	0.0000
Residual	3119.28157	9444	.330292416		R-squared =	0.1912
					Adj R-squared =	0.1906
Total	3856.44073	9450	.408088966		Root MSE =	.57471

lnwages	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
schooling	.0683854	.0021062	32.47	0.000	.0642569	.072514
experience	.0258073	.0023908	10.79	0.000	.0211209	.0304938
experiencesq	-.000234	.0000588	-3.98	0.000	-.0003493	-.0001187
male	.1517429	.0122376	12.40	0.000	.1277545	.1757312
partymember	.1125406	.0141015	7.98	0.000	.0848985	.1401826
ethnicmino~y	.0478884	.0301769	1.59	0.113	-.0112648	.1070416
_cons	7.922315	.0352793	224.56	0.000	7.85316	7.99147

Year 2002- Schooling RTE with ownership:

Source	SS	df	MS		Number of obs =	9451
					F(9, 9441) =	276.78
Model	805.097546	9	89.4552829		Prob > F =	0.0000
Residual	3051.34318	9441	.323201269		R-squared =	0.2088
					Adj R-squared =	0.2080
Total	3856.44073	9450	.408088966		Root MSE =	.56851

lnwages	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
schooling	.0649101	.0020982	30.94	0.000	.0607973	.069023
experience	.0272184	.002369	11.49	0.000	.0225747	.0318622
experiencesq	-.0002576	.0000582	-4.43	0.000	-.0003717	-.0001435
male	.1436533	.0121624	11.81	0.000	.1198124	.1674941
partymember	.1041903	.0139704	7.46	0.000	.0768052	.1315754
ethnicmino~y	.0513279	.0298648	1.72	0.086	-.0072135	.1098693
stateowned	.0123252	.0185136	0.67	0.506	-.0239655	.0486159
localpublic	-.1325126	.0154317	-8.59	0.000	-.1627621	-.1022632
collective	-.2975031	.0240543	-12.37	0.000	-.3446548	-.2503515
_cons	7.995943	.0353263	226.35	0.000	7.926696	8.06519

Year 2002- Schooling RTE with economic sector:

Source	SS	df	MS		
Model	496.968236	12	41.4140197		
Residual	1891.06436	6911	.273631074		
Total	2388.03259	6923	.344941874		

Number of obs	=	6924			
F(12, 6911)	=	151.35			
Prob > F	=	0.0000			
R-squared	=	0.2081			
Adj R-squared	=	0.2067			
Root MSE	=	.5231			

lnwages	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
schooling	.0578313	.0025479	22.70	0.000	.0528367	.0628259
experience	.0262046	.002798	9.37	0.000	.0207197	.0316896
experiencesq	-.0002413	.0000661	-3.65	0.000	-.000371	-.0001117
male	.0975639	.013319	7.33	0.000	.0714547	.1236732
partymember	.0686542	.0143102	4.80	0.000	.0406018	.0967066
ethnicmino~y	.0241107	.0319809	0.75	0.451	-.0385818	.0868032
agriculture	-.1183088	.050932	-2.32	0.020	-.2181512	-.0184663
mining	-.3292576	.0453981	-7.25	0.000	-.4182518	-.2402635
manufactur~g	-.2531195	.0156336	-16.19	0.000	-.2837662	-.2224729
construction	-.14878	.0365402	-4.07	0.000	-.22041	-.0771499
transporta~n	-.0497698	.0238892	-2.08	0.037	-.0966001	-.0029396
commerce	-.2824442	.0270236	-10.45	0.000	-.3354187	-.2294697
_cons	8.233633	.0465086	177.03	0.000	8.142462	8.324804

Year 2002- Schooling RTE with ownership &economic sector:

Source	SS	df	MS		
Model	859.545221	15	57.3030147		
Residual	2996.89551	9435	.317635984		
Total	3856.44073	9450	.408088966		

Number of obs	=	9451			
F(15, 9435)	=	180.40			
Prob > F	=	0.0000			
R-squared	=	0.2229			
Adj R-squared	=	0.2217			
Root MSE	=	.56359			

lnwages	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
schooling	.0599507	.0021358	28.07	0.000	.0557641	.0641374
male	.1440927	.0121662	11.84	0.000	.1202444	.167941
partymember	.0933313	.0139042	6.71	0.000	.066076	.1205866
ethnicmino~y	.042677	.0296345	1.44	0.150	-.015413	.1007669
experience	.0277092	.0023538	11.77	0.000	.0230953	.0323232
experiencesq	-.0002804	.0000578	-4.85	0.000	-.0003937	-.0001671
agriculture	-.0243953	.0521791	-0.47	0.640	-.1266776	.0778871
manufactur~g	-.1360328	.015579	-8.73	0.000	-.1665709	-.1054947
mining	-.2501764	.0484729	-5.16	0.000	-.3451937	-.1551591
construction	-.0236165	.03431	-0.69	0.491	-.0908716	.0436385
transporta~n	.0353048	.0232977	1.52	0.130	-.0103637	.0809733
commerce	-.1832401	.0195215	-9.39	0.000	-.2215065	-.1449737
stateowned	.0348592	.0194469	1.79	0.073	-.0032609	.0729792
localpublic	-.1011874	.0160829	-6.29	0.000	-.1327133	-.0696615
collective	-.261816	.0242627	-10.79	0.000	-.3093762	-.2142558
working	(omitted)					
_cons	8.103968	.0366529	221.10	0.000	8.03212	8.175815

Year 2002- education level RTE with ownership & economic sector:

Source	SS	df	MS	Number of obs =	9443
				F(19, 9423) =	153.52
Model	910.968081	19	47.9456885	Prob > F =	0.0000
Residual	2942.92605	9423	.312313069	R-squared =	0.2364
				Adj R-squared =	0.2348
Total	3853.89413	9442	.408165021	Root MSE =	.55885

lnwages	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
collegegrad	.8249396	.0394569	20.91	0.000	.7475955	.9022837
professional	.5877378	.0366152	16.05	0.000	.515964	.6595116
midprofess~l	.4704559	.0377309	12.47	0.000	.3964952	.5444167
upmiddle	.3629469	.035785	10.14	0.000	.2928006	.4330932
lowmiddle	.1976037	.0358399	5.51	0.000	.1273497	.2678577
male	.1396334	.0121432	11.50	0.000	.1158302	.1634366
partymember	.0567532	.0140641	4.04	0.000	.0291846	.0843218
ethnicmino~y	.0446567	.0294564	1.52	0.130	-.0130842	.1023975
experience	.026482	.0023581	11.23	0.000	.0218596	.0311045
experiencesq	-.0002344	.0000581	-4.03	0.000	-.0003483	-.0001205
agriculture	-.0041702	.051784	-0.08	0.936	-.105678	.0973376
manufactur~g	-.1137054	.0155518	-7.31	0.000	-.1441902	-.0832205
mining	-.235178	.0480824	-4.89	0.000	-.3294298	-.1409262
construction	-.0042045	.0340495	-0.12	0.902	-.0709488	.0625399
transporta~n	.0596631	.0232147	2.57	0.010	.0141572	.105169
commerce	-.1604779	.0194672	-8.24	0.000	-.1986378	-.122318
stateowned	.0401897	.0193016	2.08	0.037	.0023544	.078025
localpublic	-.0920121	.0159848	-5.76	0.000	-.1233457	-.0606785
collective	-.2408015	.0241423	-9.97	0.000	-.2881256	-.1934773
working	(omitted)					
_cons	8.36184	.0409302	204.30	0.000	8.281608	8.442072

Year 2002-State-owned

Source	SS	df	MS	Number of obs =	1143
				F(16, 1126) =	16.37
Model	65.4201227	16	4.08875767	Prob > F =	0.0000
Residual	281.211124	1126	.24974345	R-squared =	0.1887
				Adj R-squared =	0.1772
Total	346.631247	1142	.303529989	Root MSE =	.49974

lnwages	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
collegegrad	.7272531	.1113215	6.53	0.000	.5088323	.945674
professional	.5930382	.1028086	5.77	0.000	.3913203	.7947561
midprofess~l	.4190519	.1053392	3.98	0.000	.2123687	.625735
upmiddle	.3651425	.1005011	3.63	0.000	.167952	.562333
lowmiddle	.2724729	.1005458	2.71	0.007	.0751948	.469751
male	.111998	.0337103	3.32	0.001	.0458559	.1781401
partymember	.0455536	.0355597	1.28	0.200	-.0242172	.1153244
ethnicmino~y	.1725027	.0964569	1.79	0.074	-.0167527	.3617582
experience	.0359349	.0067667	5.31	0.000	.0226582	.0492116
experiencesq	-.0005202	.0001606	-3.24	0.001	-.0008353	-.0002051
agriculture	-.1801015	.2530193	-0.71	0.477	-.6765439	.3163409
manufactur~g	-.1507372	.0383288	-3.93	0.000	-.2259412	-.0755333
mining	-.3055832	.0656073	-4.66	0.000	-.4343095	-.1768569
construction	-.1071301	.0663714	-1.61	0.107	-.2373555	.0230954
transporta~n	.0148417	.045969	0.32	0.747	-.0753528	.1050362
commerce	-.1306504	.0882663	-1.48	0.139	-.3038354	.0425345
_cons	8.405232	.1227302	68.49	0.000	8.164426	8.646038

Year 2002 -Non-state-owned

Source	SS	df	MS		
Model	804.803206	16	50.3002004	Number of obs	= 8300
Residual	2690.34807	8283	.324803582	F(16, 8283)	= 154.86
				Prob > F	= 0.0000
Total	3495.15128	8299	.421153305	R-squared	= 0.2303
				Adj R-squared	= 0.2288
				Root MSE	= .56992

lnwages	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
collegegrad	.8459521	.042418	19.94	0.000	.7628022	.929102
professional	.5925195	.0393819	15.05	0.000	.5153211	.6697178
midprofess~l	.4775989	.0406435	11.75	0.000	.3979275	.5572703
upmiddle	.3551691	.0384908	9.23	0.000	.2797175	.4306208
lowmiddle	.1752924	.0385696	4.54	0.000	.0996863	.2508985
male	.1493263	.013081	11.42	0.000	.1236842	.1749684
partymember	.0603437	.0153562	3.93	0.000	.0302417	.0904457
ethnicmino~y	.0312188	.0312431	1.00	0.318	-.0300256	.0924631
experience	.024247	.0025353	9.56	0.000	.0192772	.0292169
experiencesq	-.0001798	.0000628	-2.86	0.004	-.000303	-.0000567
agriculture	-.0147296	.0537229	-0.27	0.784	-.1200399	.0905807
manufactur~g	-.1529334	.0162805	-9.39	0.000	-.1848471	-.1210196
mining	-.2641638	.068832	-3.84	0.000	-.3990918	-.1292358
construction	-.0234403	.0389511	-0.60	0.547	-.0997941	.0529135
transporta~n	.0354682	.0265201	1.34	0.181	-.0165178	.0874541
commerce	-.1718935	.0202501	-8.49	0.000	-.2115889	-.1321981
_cons	8.35151	.043811	190.63	0.000	8.265629	8.43739

95 Beijing

Source	SS	df	MS		
Model	43.1586028	6	7.19310046	Number of obs	= 866
Residual	199.257193	859	.231964137	F(6, 859)	= 31.01
				Prob > F	= 0.0000
Total	242.415796	865	.280249475	R-squared	= 0.1780
				Adj R-squared	= 0.1723
				Root MSE	= .48163

lnwages	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
schooling	.0307714	.0064072	4.80	0.000	.0181958	.043347
male	.1020577	.0336453	3.03	0.002	.0360211	.1680943
partymember	.1372203	.0386234	3.55	0.000	.0614129	.2130276
ethnicmino~y	-.0321803	.0706101	-0.46	0.649	-.1707687	.1064082
experience	.0360367	.0057386	6.28	0.000	.0247735	.0473
experiencesq	-.0005015	.0001341	-3.74	0.000	-.0007647	-.0002384
working	(omitted)					
_cons	8.027519	.1054555	76.12	0.000	7.820538	8.2345

95 Anhui

Source	SS	df	MS	Number of obs =	847
				F(6, 840) =	58.11
Model	75.6148321	6	12.602472	Prob > F =	0.0000
Residual	182.167622	840	.216866216	R-squared =	0.2933
				Adj R-squared =	0.2883
Total	257.782454	846	.304707392	Root MSE =	.46569

lnwages	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
schooling	.041149	.0058398	7.05	0.000	.0296866	.0526113
male	.1514897	.0335698	4.51	0.000	.0855991	.2173802
partymember	.0995546	.0427342	2.33	0.020	.0156763	.1834329
ethnicmino~y	.0110945	.1415216	0.08	0.938	-.2666829	.2888719
experience	.049718	.0057744	8.61	0.000	.038384	.0610519
experiencesq	-.0006834	.0001353	-5.05	0.000	-.0009489	-.0004178
working	(omitted)					
_cons	7.276381	.0866849	83.94	0.000	7.106237	7.446525

95 Guangdong

Source	SS	df	MS	Number of obs =	1033
				F(6, 1026) =	42.65
Model	95.4224231	6	15.9037372	Prob > F =	0.0000
Residual	382.576979	1026	.372882045	R-squared =	0.1996
				Adj R-squared =	0.1949
Total	477.999402	1032	.463177715	Root MSE =	.61064

lnwages	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
schooling	.0452613	.0061696	7.34	0.000	.0331548	.0573678
male	.1018952	.0400761	2.54	0.011	.0232547	.1805357
partymember	.1485956	.0477603	3.11	0.002	.0548765	.2423147
ethnicmino~y	-.3688732	.0935048	-3.94	0.000	-.5523557	-.1853908
experience	.0566544	.0070461	8.04	0.000	.042828	.0704807
experiencesq	-.0010058	.0001794	-5.61	0.000	-.0013579	-.0006538
working	(omitted)					
_cons	8.050744	.0943145	85.36	0.000	7.865673	8.235815

95 Gansu

Source	SS	df	MS	Number of obs =	670
Model	100.994977	6	16.8324961	F(6, 663) =	62.61
Residual	178.232035	663	.268826598	Prob > F =	0.0000
				R-squared =	0.3617
Total	279.227011	669	.417379688	Adj R-squared =	0.3559
				Root MSE =	.51848

lnwages	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
schooling	.0556022	.0068745	8.09	0.000	.0421037	.0691007
male	.1504761	.0418353	3.60	0.000	.0683303	.2326218
partymember	.1004106	.0514205	1.95	0.051	-.000556	.2013771
ethnicmino~y	.0146203	.1003956	0.15	0.884	-.1825112	.2117519
experience	.0629014	.0073684	8.54	0.000	.0484332	.0773697
experiencesq	-.0008309	.0001809	-4.59	0.000	-.0011862	-.0004756
working	(omitted)					
_cons	6.873004	.1042865	65.91	0.000	6.668232	7.077775

Average

Source	SS	df	MS	Number of obs =	11980
Model	1056.50635	6	176.084391	F(6, 11973) =	549.19
Residual	3838.8346	11973	.320624288	Prob > F =	0.0000
				R-squared =	0.2158
Total	4895.34094	11979	.408660234	Adj R-squared =	0.2154
				Root MSE =	.56624

lnwages	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
schooling	.0422498	.001823	23.18	0.000	.0386763	.0458232
male	.117859	.0107577	10.96	0.000	.0967721	.1389458
partymember	.1082093	.0131298	8.24	0.000	.0824728	.1339457
ethnicmino~y	-.0500924	.0255381	-1.96	0.050	-.1001512	-.0000336
experience	.051272	.0019163	26.76	0.000	.0475158	.0550283
experiencesq	-.0007123	.0000465	-15.32	0.000	-.0008034	-.0006211
working	(omitted)					
_cons	7.426856	.0280638	264.64	0.000	7.371846	7.481865

02 Beijing

Source	SS	df	MS	Number of obs =	808
				F(6, 801) =	26.68
Model	35.8266673	6	5.97111121	Prob > F =	0.0000
Residual	179.283584	801	.223824699	R-squared =	0.1666
				Adj R-squared =	0.1603
Total	215.110251	807	.266555453	Root MSE =	.4731

lnwages	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
schooling	.0695712	.0071265	9.76	0.000	.0555824	.08356
male	.2083857	.0337791	6.17	0.000	.1420798	.2746916
partymember	.0426427	.0396844	1.07	0.283	-.035255	.1205405
ethnicmino~y	-.0380887	.0743044	-0.51	0.608	-.1839431	.1077657
experience	.0028762	.0063593	0.45	0.651	-.0096068	.0153591
experiencesq	.0001076	.0001528	0.70	0.482	-.0001923	.0004075
working	(omitted)					
_cons	8.60394	.1193811	72.07	0.000	8.369603	8.838277

02 Anhui

Source	SS	df	MS	Number of obs =	620
				F(6, 613) =	39.84
Model	62.3633564	6	10.3938927	Prob > F =	0.0000
Residual	159.940753	613	.260914768	R-squared =	0.2805
				Adj R-squared =	0.2735
Total	222.304109	619	.359134263	Root MSE =	.5108

lnwages	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
schooling	.0681746	.0076082	8.96	0.000	.0532333	.0831158
male	.2312069	.0430516	5.37	0.000	.1466604	.3157534
partymember	.1291119	.0503637	2.56	0.011	.0302055	.2280183
ethnicmino~y	-.0511426	.1644927	-0.31	0.756	-.3741802	.271895
experience	.0528765	.0086096	6.14	0.000	.0359686	.0697844
experiencesq	-.0008316	.0002093	-3.97	0.000	-.0012425	-.0004206
working	(omitted)					
_cons	7.472908	.1303156	57.34	0.000	7.216989	7.728827

02 Guangdong

Source	SS	df	MS	Number of obs =	895
Model	79.449346	6	13.2415577	F(6, 888) =	37.65
Residual	312.327805	888	.351720501	Prob > F =	0.0000
				R-squared =	0.2028
Total	391.777151	894	.438229475	Adj R-squared =	0.1974
				Root MSE =	.59306

lnwages	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
schooling	.0711417	.0077349	9.20	0.000	.0559609	.0863224
male	.1820431	.0411949	4.42	0.000	.1011924	.2628939
partymember	.2077284	.0475187	4.37	0.000	.1144663	.3009904
ethnicmino~y	.4524592	.1998905	2.26	0.024	.0601463	.8447721
experience	.0456512	.0083581	5.46	0.000	.0292473	.0620552
experiencesq	-.0008732	.0002042	-4.28	0.000	-.0012739	-.0004724
working	(omitted)					
_cons	8.208092	.1271659	64.55	0.000	7.958511	8.457672

02 Gansu

Source	SS	df	MS	Number of obs =	546
Model	52.8622445	6	8.81037408	F(6, 539) =	32.33
Residual	146.87148	539	.272488832	Prob > F =	0.0000
				R-squared =	0.2647
Total	199.733725	545	.366483899	Adj R-squared =	0.2565
				Root MSE =	.522

lnwages	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
schooling	.0771769	.009298	8.30	0.000	.0589122	.0954417
male	.1538827	.04697	3.28	0.001	.061616	.2461493
partymember	.1226062	.0561701	2.18	0.029	.012267	.2329453
ethnicmino~y	-.0535373	.1330101	-0.40	0.687	-.3148189	.2077443
experience	.0369152	.0090035	4.10	0.000	.019229	.0546014
experiencesq	-.000434	.000221	-1.96	0.050	-.0008682	1.89e-07
working	(omitted)					
_cons	7.517129	.1466062	51.27	0.000	7.22914	7.805119